

PATENT ABSTRACTS OF JAPAN

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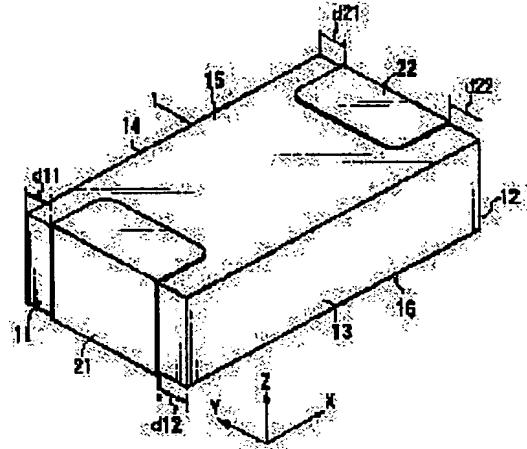
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(54) CHIP-SHAPED ELECTRONIC COMPONENT

(57)Abstract:

PROBLEM TO BE SOLVED: To provide a chip-shaped electronic component which is capable of sharply improve mounting density.

SOLUTION: For a substrate 1, both sides faces 11 and 12 in a longitudinal direction X and both side faces 13 and 14 in a lateral direction Y cross each other. Outer electrodes 21 and 22 are severally installed only at both ends in the longitudinal direction X of the substrate 1 and are made to be electrically continuous with circuit elements and intervals d11 and d12 and d21 and d22 apart from both side faces 13 and 14 in the lateral direction Y.



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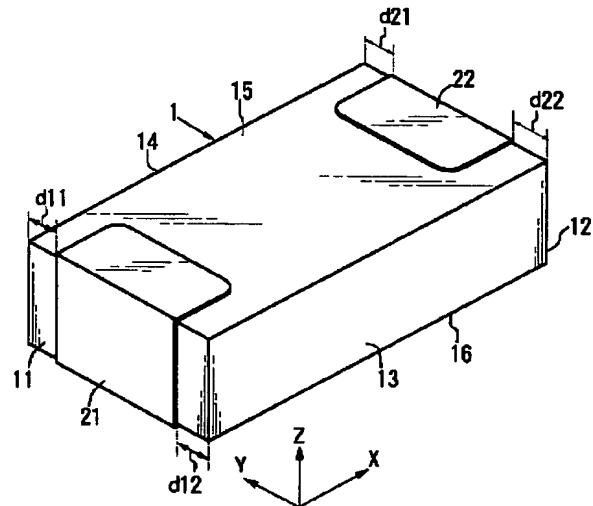
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(54) 【発明の名称】チップ状電子部品

(57) 【要約】

【課題】実装密度を大幅に向上させ得るチップ状電子部品を提供する。

【解決手段】基体1は、長さ方向Xの両側面11、12と、幅方向Yの両側面13、14とが交叉する。外部電極21、22のそれぞれは、基体1の長さ方向Xの両端部にのみ備えられ、回路要素に導通し、かつ、幅方向Yの両側面13、14から間隔(d11、d12)、(d21、d22)を隔てて形成されている。



【特許請求の範囲】

【請求項1】 基体と、複数の外部電極とを含むチップ状電子部品であって、

前記基体は、長さ方向の両側面と、幅方向の両側面とが交叉し、回路要素を有しており、
前記外部電極のそれぞれは、前記基体の前記長さ方向の両端部にのみ備えられ、前記回路要素に導通し、かつ、
前記幅方向の前記両側面から間隔を隔てて形成されているチップ状電子部品。

【請求項2】 請求項1に記載されたチップ状電子部品であって、

前記間隔は、 $10\ \mu m$ 以上であるチップ状電子部品。

【請求項3】 請求項1に記載されたチップ状電子部品であって、

前記外部電極のそれぞれは、一対の電極片を含み、
前記一対の電極片は、前記基体の前記長さ方向の各側面において、厚み方向に間隔を隔てて備えられるチップ状電子部品。

【請求項4】 請求項1に記載されたチップ状電子部品であって、

前記基体は、前記長さ方向の両側面における前記幅方向の中間部に、厚み方向に沿う凹部を有するチップ状電子部品。

【請求項5】 請求項4に記載されたチップ状電子部品であって、

前記外部電極のそれぞれは、前記凹部に備えられ、かつ、厚み方向の両面において、前記長さ方向の前記両側面から間隔を隔てて形成されているチップ状電子部品。

【請求項6】 請求項1に記載されたチップ状電子部品であって、

前記基体は、内部電極を有し、前記内部電極が前記外部電極のそれぞれに導通しているチップ状電子部品。

【請求項7】 請求項1に記載されたチップ状電子部品であって、セラミックコンデンサであるチップ状電子部品。

【発明の詳細な説明】

【0001】

【発明の属する技術分野】本発明は、チップ状電子部品に関する。

【0002】

【従来の技術】近年、電子機器の小型化に伴い、チップ状電子部品の超小型化に拍車がかかっている。例えば、積層セラミックチップコンデンサは、長さ0.6mm、幅0.3mm、厚み0.1~0.3mmという微少寸法にまで小型化されている。

【0003】ところが、従来のチップ状電子部品は、回路基板上の導体パターンにハンダ付する外部電極を、基体の長さ方向の両端において、長さ方向の1側面、及び厚み方向の2面のみならず、幅方向の2側面にも付着してあったため、回路基板に実装する場合、幅方向の両側

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において、他のチップ状電子部品または回路素子との間に、絶縁間隔を設けて配置する必要があった。

【0004】しかも、ハンダ付けプロセスにおいて、外部電極に付着したハンダが、その流動性と、チップ状電子部品の重みとにより、幅方向に拡がり、幅方向の両側面から外側にはみ出す現象（ハンダはみ出し）を生じる。従って、チップ状電子部品の幅方向の両側に設ける絶縁間隔は、このようなハンダはみ出し（ハンダフィレット）による電気的短絡を発生させないような寸法に設定しなければならない。

【0005】このため、チップ状電子部品の超小型化にかかわらず、実装密度の向上に限界を生じていた。

【0006】かかる問題を解決する手段として、特開平7-201634号公報は、回路基板にハンダ付けされる面のみに外部電極を設けたセラミックチップ部品を開示している。しかし、この先行技術の場合、外部電極がセラミックチップ部品の幅方向の全幅にわたって形成されているので、ハンダの流動性と、セラミックチップ部品の重みとにより、ハンダが幅方向に拡がり、幅方向の両側面からはみ出す現象を阻止することができない。

【0007】また、別の解決手段として、特開平9-55333号公報は、外部電極を基体の長さ方向の両端部において、幅方向の両側面および厚み方向の両端面に設ける構造を開示している。この先行技術文献の場合、外部電極が幅方向の両側面に形成されているから、特開平7-201634号公報と同様の問題を生じる。

【0008】

【発明が解決しようとする課題】本発明の課題は、実装密度を大幅に向上させ得るチップ状電子部品を提供することである。

【0009】

【課題を解決するための手段】上述した課題を解決するため、本発明に係るチップ状電子部品は、基体と、複数の外部電極とを含む。前記基体は、長さ方向の両側面と、幅方向の両側面とが交叉し、回路要素を有する。前記外部電極のそれぞれは、前記基体の前記長さ方向の両端部にのみ備えられ、回路要素に導通し、かつ、前記幅方向の前記両側面から間隔を隔てて形成されている。

【0010】上述のように、基体は、長さ方向の両側面と、幅方向の両側面とが交叉している。即ち、基体は、その形状が略直方体となる。このような形状であれば、例えば、多数のチップ状電子部品要素を形成したウエハーを、格子状に切断する等の手段によって、個々のチップ状電子部品を取り出す製造方法を採用できる。このため、量産性に優れたチップ状電子部品が得られる。

【0011】基体は回路要素を有しており、外部電極のそれぞれは回路要素に導通しているから、基体に備えられた回路要素の電気的特性を、外部電極から外部に取り出すことができる。

【0012】外部電極のそれぞれは、基体の長さ方向の

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両端部にそれぞれ備えられている。かかる構造によれば、基体の長さ方向の両端部の外部電極を、回路基板上の導体パターン等にハンダ付けして実装するチップ状電子部品が得られる。

【0013】基体は、長さ方向の側面と、幅方向の両側面とが交叉しており、外部電極のそれぞれは、幅方向の両側面から間隔を隔てて形成されている。このような構造であると、外部電極と、基体の幅方向の両側面との間に、ハンダ付けされ得ない基体面が生じる。したがって、回路基板上に実装する場合、当該チップ状電子部品と、隣接するチップ状電子部品または回路素子との間の間隔を狭くしても、当該チップ状電子部品の外部電極と、隣接回路素子との間に、ハンダフィレット等を生じる余地がない。このため、回路基板に対する実装密度を大幅に向上させることができる。

【0014】本発明に係るチップ状電子部品には、コンデンサ、インダクタ、抵抗、サーミスタまたはバリスタ等の各種のチップ状電子部品が含まれる。これらのチップ状電子部品を組み合わせた複合部品であってもよい。基体の材質もしくは電気的特性または回路要素の種類等は、目的とするチップ状電子部品に応じて選定される。

【0015】例えば、セラミックコンデンサを得る場合には、基体を誘電体セラミックで構成する。この場合、内部電極と誘電体層とを交互に積層すれば、積層セラミックコンデンサが得られる。

【0016】インダクタを得る場合には、基体をフェライト等の磁性体で構成し、基体に導体を設ける。導体は基体の表面、または、内部に、直線状、スパイラル状またはジグザグ状に配置する。

【0017】他のチップ状電子部品、例えば、抵抗、サーミスタ、バリスタ等についても、それぞれの特性に沿った基体材質及び回路要素を採用する。

【0018】本発明の他の目的、構成及び利点については、添付図面を参照し、更に詳しく説明する。図面は、単に、実施例を示すに過ぎない。

【0019】

【発明の実施の形態】図1は本発明に係るチップ状電子部品を示す斜視図、図2は図1に示したチップ状電子部品の平面図、図3は図1に示したチップ状電子部品の正面図、図4は図2の4-4線に沿った断面図である。図示されたチップ状電子部品は、積層セラミックコンデンサであって、基体1と、外部電極21、22とを含む。

【0020】基体1は、長さ方向Xの両側面11、12と、幅方向Yの両側面13、14とが交叉する。即ち、基体1は、その形状が略直方体となる。このような形状であれば、例えば、多数のチップ状電子部品要素を形成したウエハーを、格子状に切断する等の手段によって、個々のチップ状電子部品を取り出す製造方法を採用できる。このため、量産性に優れたチップ状電子部品が得られる。

【0021】基体1は長さ方向Xの寸法L=2.2mm以下の値に選定される。積層セラミックコンデンサの場合、代表的には、C0603タイプ(L×W×T=0.6×0.3×0.2(mm))、C1005タイプ(L×W×T=1.0×0.5×0.4(mm))、C2012タイプ(L×W×T=2.0×1.2×1.0(mm))等がその典型的なディメンションである。

【0022】基体1は、各面の交差する稜角部に丸味を付してあることが望ましい。このような丸味はバレル研磨を施すことによって付与することができる。実施例において、基体1はセラミックコンデンサとして適した誘電体セラミックである。

【0023】基体1は回路要素を有する。図1～図4に示した実施例は積層セラミックコンデンサを示しており、回路要素は内部電極30～39と、内部電極30～39の間にある誘電体セラミック層によって構成される。内部電極30～39は、基体1の内部に埋設されている。このように、回路要素を構成する内部電極30～39が、基体1の内部に埋設されているから、基体1によって内部電極30～39を保護し、耐湿性、耐久性、耐衝撃性及び電気絶縁性等を向上させたチップ状電子部品が得られる。

【0024】内部電極30～39は、厚み方向Zに重なり、長さ方向Xの一端が、長さ方向Xの両側面11、12に交互に導出されている。即ち、偶数参照符号が付された内部電極30、32、34、36、38は、長さ方向Xの一端が側面12に導出され、奇数参照符号が付された内部電極31、33、35、37、39は、一端が、側面11に導出されている。内部電極の個数は任意である。

【0025】内部電極30～39は、ほぼ同じ平面形状を有している。例えば、内部電極31を代表的に取り出して説明すると、図4に示すように、引き出し電極部分310の幅方向Yの寸法d3が、外部電極21の幅方向Yの寸法d4より小さくなっている。内部電極31を基準にして、一つおきに数えられた内部電極、即ち奇数参照符号の付された内部電極33～39も、内部電極31と同じ形状を有する。偶数参照符号の付された内部電極30～38は、図4において、左右反転させた形状を有する。

【0026】図5は内部電極30～39の別の態様を示している。図5において、内部電極31は、引き出し電極部分310の幅方向Yの寸法d3が、外部電極21の幅方向Yの寸法d4とほぼ等しくなっている。但し、図4、図5に示された内部電極パターンは一例であり、その他、種々のパターンを取り得ることはいうまでもない。

【0027】再び、図1～図4を参照して説明する。外部電極21、22のうち、外部電極21は、基体1の長さ方向Xの一端部に備えられ、かつ、幅方向Yの両側面13、14から、それぞれ、間隔d11、d12を隔て

て形成されている。外部電極22は、基体1の長さ方向Xの他端部に備えられ、かつ、幅方向Yの両側面13、14から、それぞれ、間隔d21、d22を隔てて形成されている。

【0028】外部電極21は、基体1の長さ方向Xの側面11に形成されれている。側面11には、奇数参照符号の付された内部電極31～39の一端が導出されているから、外部電極21は、奇数参照符号の付された内部電極31～39に導通される。外部電極22は、基体1の長さ方向Xの側面12に形成されている。側面12には、偶数参照符号の付された内部電極30～38の一端が導出されているから、外部電極22は、偶数参照符号の付された内部電極30～38に導通される。外部電極21、22は、この種電子部品において周知の技術の適用によって形成できる。

【0029】上記構造によれば、内部電極30～39の層数及び対向面積と、その間にある誘電体セラミック層の誘電率及び層数とによって定まる静電容量を、外部電極21、22から外部に取り出すことができる。

【0030】実施例において、外部電極21は、基体1の長さ方向Xの側面11及び厚み方向Zの両面15、16に連続して形成される。外部電極22は、基体1の長さ方向Xの側面12及び厚み方向Zの両面15、16に連続して形成される。これによる、充分に大きなハンダ付け面積を確保できる。

【0031】図6は図1～図5に示したチップ状電子部品の実装状態を示す図、図7は図6の7-7線に沿った断面図である。図示するように、回路基板4への実装に当たり、基体1の長さ方向Xの両端部に備えられた外部電極21を、回路基板4上の導体パターン41にハンダ付けし、長さ方向Xの他端部の外部電極22を、回路基板4上の導体パターン42にハンダ付けする。

【0032】ここで、本発明に係るチップ状電子部品において、基体1は、長さ方向Xの側面11、12と、幅方向Yの両側面13、14とが交叉しており、外部電極21は、幅方向Yの両側面13、14から間隔d11、d12を隔てて形成されているから、外部電極21と、基体1の幅方向Yの両側面13、14との間に、間隔d11、d12の基体表面が生じる。この間隔d11、d12の基体表面は、ハンダ付けされ得ない。

【0033】外部電極22も、幅方向Yの両側面13、14から、間隔d21、d22を隔てて形成されているから、外部電極21、22と、基体1の幅方向Yの両側面13、14との間に、間隔d21、d22の基体表面が生じる。この間隔d21、d22の基体表面は、ハンダ付けされ得ない。

【0034】したがって、図6に図示するように、回路基板4上に2つのチップ状電子部品Q1、Q2を実装した場合、チップ状電子部品Q1～Q2間の間隔を狭くしても、チップ状電子部品Q1～Q2間に、ハンダフィレ

ット等を生じる余地がない。このため、回路基板4に対する実装密度を大幅に向上させることができる。当該チップ状電子部品と隣接して配置されるチップ状電子部品は、他種のチップ状電子部品であってもよいし、導体パターン等であってもよい。この場合にも、同様の作用効果を奏する。

【0035】図8は多数のチップ状電子部品を実装した状態を示している。図示するように、チップ状電子部品Q11～Q33のそれぞれを、実質的に接触したようなきわめて狭い間隔を隔てて、幅方向に配列して行くことができる。

【0036】間隔d11、d12、d21、d22は10μm以上であることが望ましい。10μm以上の間隔であると、外部電極21、22と他の回路素子との間にハンダフィレットが発生するのを、確実に阻止することができる。

【0037】外部電極21、22は、充分なハンダ付け強度を確保する観点から、長さ方向Xに相対する両側面11、12のそれぞれにおいて、30%以上の面積を占有することが好ましい。

【0038】図9は本発明に係るチップ状電子部品の別の実施例を示す斜視図、図10は図9に示したチップ状電子部品の平面図、図11は図10の11-11線に沿った断面図、図12は図11の12-12線に沿った断面図である。これらの図において、図1～図5に図示された構成部分と同一の構成部分に対して、同一の参照符号を付してある。この実施例では、部電極211、212のそれは、一対の電極片(211、212)、(221、222)を含んでいる。一対の電極片211、212は、基体1の長さ方向Xの側面11において、厚み方向Zに間隔d15を隔てて配置されている。同様に、一対の電極片221、222は、基体1の長さ方向Xの側面12において、厚み方向Zに間隔d25(図11参照)を隔てて配置されている。

【0039】基体1の長さ方向Xの両端側には、基体1の厚み方向Zに延びる導体(スルーホール導体)210、220が埋設されている。導体210は基体1の内部において、奇数参照符号の付された内部電極31～39に導通し、更に、厚み方向Zの両面15、16において、電極片211、212にそれぞれ導通している(図11、12参照)。導体220は基体1の内部において、偶数参照符号の付された内部電極30～38に導通し、更に、厚み方向Zの両面15、16において、電極片221、222にそれぞれ導通している。

【0040】図9～図12に図示された実施例において、外部電極21を構成する電極片211は、幅方向Yの側面14から間隔d11を隔てて形成されているから、電極片211と、基体1の幅方向Yの側面14との間に、間隔d11のハンダ付けされ得ない基体表面が生じる。外部電極21を構成するもう一つの電極片212

は、幅方向Yの側面14から間隔d12を隔てて形成されているから、電極片212と、基体1の幅方向Yの側面14との間に、間隔d12のハンダ付けされ得ない基体表面が生じる。

【0041】更に、外部電極22を構成する電極片221は、幅方向Yの側面13から間隔d21を隔てて形成されているから、電極片221と、基体1の幅方向Yの側面13との間に、間隔d21をもって、ハンダ付けされ得ない基体表面が生じる。また、外部電極22を構成する電極片222は、幅方向Yの側面14から間隔d22を隔てて形成されているから、電極片222と、基体1の幅方向Yの側面14との間に、間隔d22をもって、ハンダ付けされ得ない基体表面が生じる。

【0042】したがって、回路基板に実装した場合、チップ状電子部品間の間隔を狭くしても、ハンダフィレット等を生じる余地がない。このため、回路基板に対する実装密度を大幅に向上させることができる。

【0043】図13は本発明に係るチップ状電子部品の別の実施例を示す斜視図、図14は図13に示したチップ状電子部品の平面図、図15は図14の15-15線に沿った断面図、図16は図15の16-16線に沿った断面図である。図において、図1～図5に図示された構成部分と同一の構成部分には、同一の参照符号を付してある。この実施例では、基体1は、長さ方向Xの両側面11、12における幅方向Yの中間部に、厚み方向Zに沿う凹部110、120を有する。凹部110、120には外部電極21、22を構成する電極部213、223が付着されている。電極部213は奇数参照符号の付された内部電極31～39に導通している（図15、16参照）。電極部223は偶数参照符号の付された内部電極30～38に導通している。

【0044】図17は図13～図16に示したチップ状電子部品の実装状態を示す図、図18は図17の18-18線に沿った断面図である。図示するように、回路基板4への実装に当たり、外部電極21を、回路基板4上の導体パターン41にハンダ付け5し、外部電極22を、回路基板4上の導体パターン42にハンダ付け5する。ハンダ付け5は、主として、凹部110、120の内部及びその周辺で行なわれる。

【0045】ここで、外部電極21は、幅方向Yの両側面13、14から間隔d11、d12を隔てて形成されているから、外部電極21と、基体1の幅方向Yの両側面13、14との間に、間隔d11、d12の基体表面が生じる。この間隔d11、d12の基体表面は、ハンダ付けされ得ない。

【0046】外部電極22も、幅方向Yの両側面13、14から、間隔d21、d22を隔てて形成されているから、外部電極21、22と、基体1の幅方向Yの両側

面13、14との間に、間隔d21、d22の基体表面が生じる。この間隔d21、d22の基体表面は、ハンダ付けされ得ない。

【0047】したがって、図17に図示するように、回路基板4上に2つのチップ状電子部品Q1、Q2を実装した場合、チップ状電子部品Q1～Q2間の間隔を狭くしても、チップ状電子部品Q1～Q2間にハンダフィレット等を生じる余地がない。このため、回路基板4に対する実装密度を大幅に向上させることができる。当該チップ状電子部品と隣接して配置されるチップ状電子部品は、他種のチップ状電子部品であってもよいし、導体パターン等であってもよい。この場合にも、同様の作用効果を奏する。

【0048】図19は本発明に係るチップ状電子部品の別の実施例を示す斜視図、図20は図19に示したチップ状電子部品の平面図、図21は図20の21-21線に沿った断面図、図22は図21の22-22線に沿った断面図である。図において、図13～図16に図示された構成部分と同一の構成部分には、同一の参照符号を付してある。図13～図16に図示された実施例と異なる点は、外部電極21、22が凹部110、120の内部に形成されていることである。この実施例の場合も、図13～図16を参照して説明したと同様の作用効果を奏する。

【0049】次に、具体的な実施例及び比較例における部品積載密度（個/cm²）のデータを示す。

【0050】実施例1～3及び比較例1、2について、3つのタイプのチップ状電子部品の部品積載密度（個/cm²）を調べた。実施例1は図1～図5に示したチップ状電子部品、実施例2は図9～図12に示したチップ状電子部品、実施例3は図13～図16に示した実施例である。比較例1は図23に示すチップ状電子部品であり、基体1の長さ方向の両端において、長さ方向の1側面、幅方向の2側面及び厚み方向の2面に外部電極21、22を付着させたチップ状電子部品、比較例2は図24に示したチップ状電子部品であり、長さ方向の両端において、基体1の厚み方向の両面にのみ、外部電極（211、212）、（221、222）を設けたチップ状電子部品である。実施例1～3及び比較例1、2とも、C0603タイプ、C1005タイプ及びC2012タイプの3種を含んでいる。これらの3種のタイプのディメンションは次のとおりである。

【0051】C0603タイプ：L×W×T=0.6×0.3×0.2（mm）

C1005タイプ：L×W×T=1.0×0.5×0.4（mm）

C2012タイプ：L×W×T=2.0×1.2×1.0（mm）

表1

	部品積載密度(個/cm ²)		
	C0603タイプ L=0.6mm W=0.3mm T=0.2mm	C1005タイプ L=1.0mm W=0.5mm T=0.4mm	C2012タイプ L=2.0mm W=1.2mm T=1.0mm
実施例1(図1~5)	303	133	33
実施例2(図9~12)	370	154	36
実施例3(図13~16)	417	167	38
比較例1	112	67	24
比較例2	185	96	29

表1に示すように、本発明に係る実施例1~3の何れも、比較例1、2よりも、部品積載密度が著しく向上している。

【0052】より具体的に説明すると、実施例1~3の場合、C1005タイプのもので、比較例1、2のC0603タイプの部品積載密度以上の部品積載密度を実現できる。部品積載密度の向上効果は、C0603タイプで特に顕著であり、例えば、実施例3の場合は、比較例1の約4倍弱の部品積載密度を実現できる。

【0053】

【発明の効果】以上説明したように、本発明によれば、回路基板に対する実装密度を大幅に向上させ得るチップ状電子部品を提供することができる。

【図面の簡単な説明】

【図1】本発明に係るチップ状電子部品を示す斜視図である。

【図2】図1に示したチップ状電子部品の平面図である。

【図3】図2の3-3線に沿った断面図である。

【図4】図3の4-4線に沿った断面図である。

【図5】本発明に係るチップ状電子部品の別の内部電極構造を示す図である。

【図6】図1~図5に示したチップ状電子部品の実装状態を示す図である。

【図7】図6の7-7線に沿った断面図である。

【図8】本発明に係るチップ状電子部品を多数実装した状態を示す図である。

【図9】本発明に係るチップ状電子部品の別の実施例を示す斜視図である。

【図10】図9に示したチップ状電子部品の平面図である。

【図11】図10の11-11線に沿った断面図である。

【図12】図11の12-12線に沿った断面図である。

【図13】本発明に係るチップ状電子部品の更に別の実施例を示す斜視図である。

【図14】図13に示したチップ状電子部品の平面図である。

【図15】図14の15-15線に沿った断面図である。

20 【図16】図15の16-16線に沿った断面図である。

【図17】図13~図16に示したチップ状電子部品の実装状態を示す平面図である。

【図18】図17の18-18線に沿った断面図である。

【図19】本発明に係るチップ状電子部品の更に別の実施例を示す斜視図である。

【図20】図19に示したチップ状電子部品の平面図である。

30 【図21】図20の21-21線に沿った断面図である。

【図22】図21の22-22線に沿った断面図である。

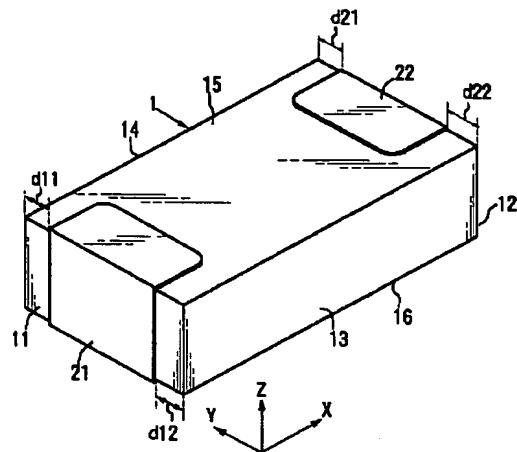
【図23】従来のチップ状電子部品(比較例1)を示す平面図である。

【図24】別の従来のチップ状電子部品(比較例2)を示す正面図である。

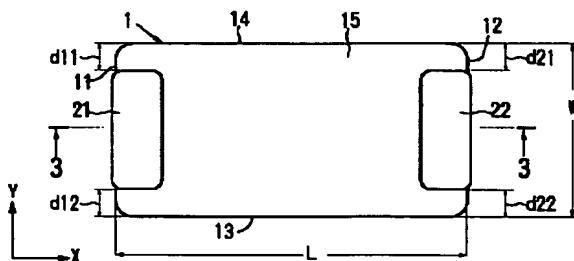
【符号の説明】

1	基体
21、22	外部電極
30~39	内部電極
4	回路基板
41、42	導体パターン

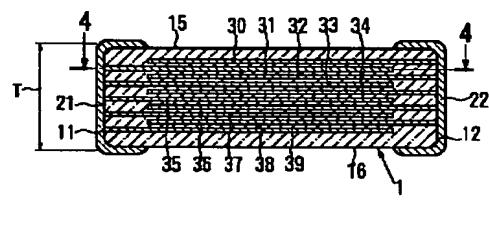
【図 1】



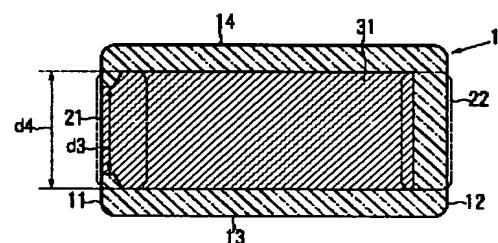
【図 2】



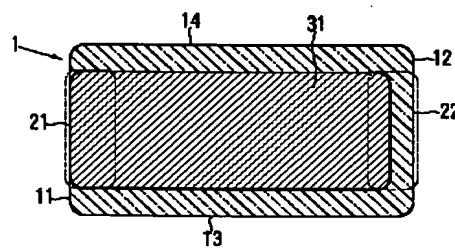
【図 3】



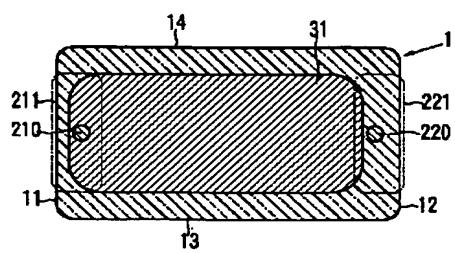
【図 4】



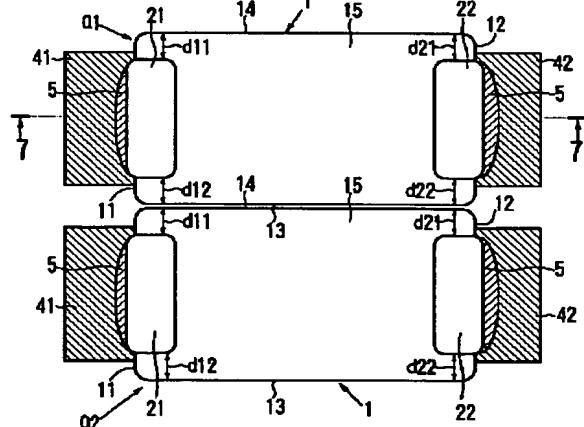
【図 5】



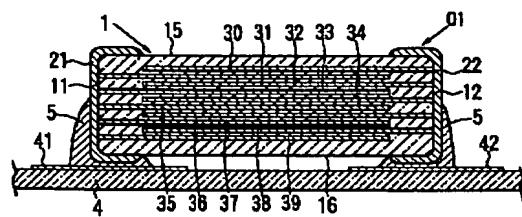
【図 12】



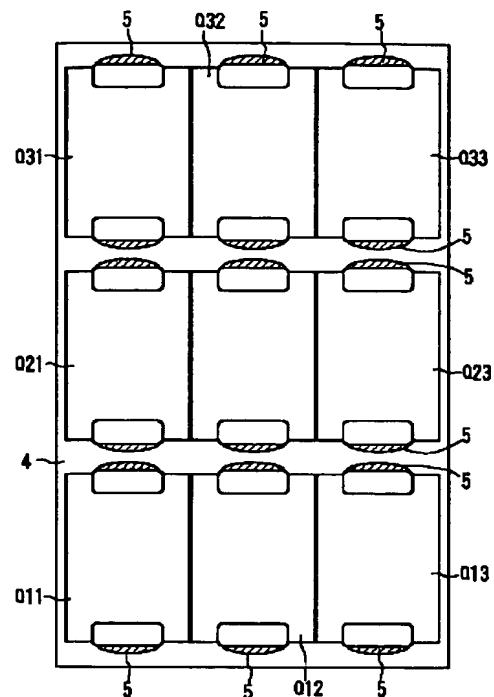
【図 6】



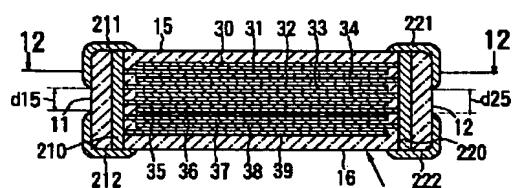
【図7】



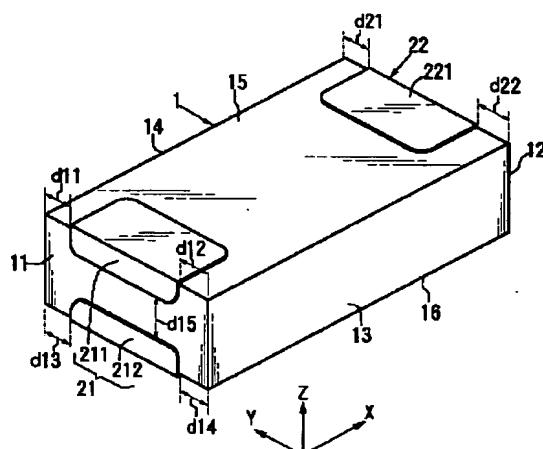
【図8】



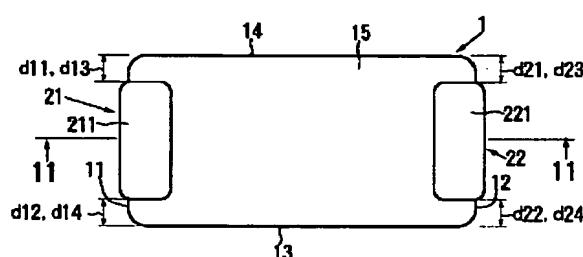
【図11】



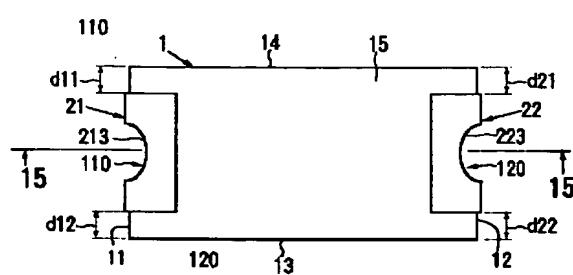
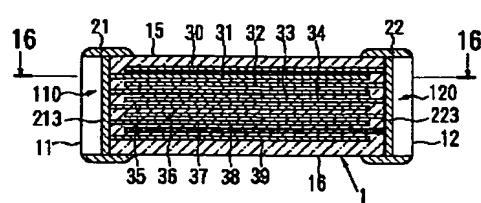
【図9】



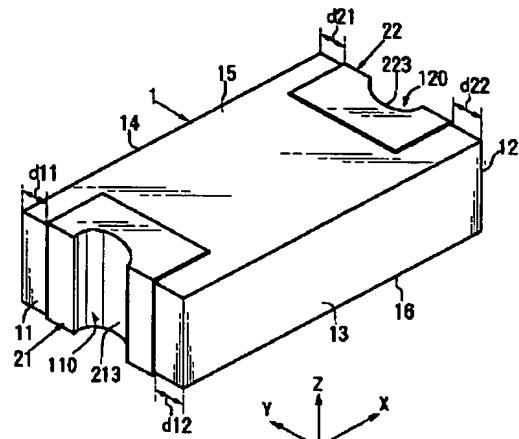
【図10】



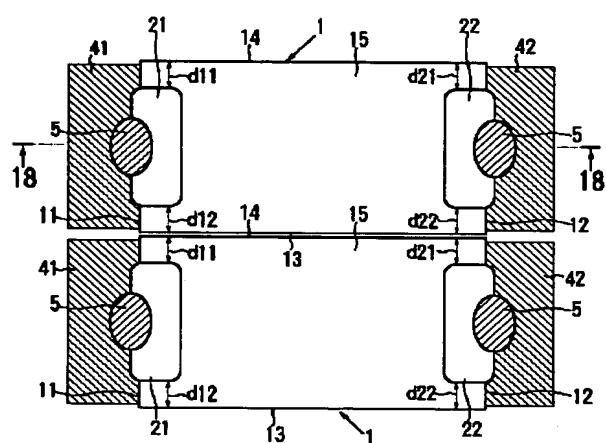
【図15】



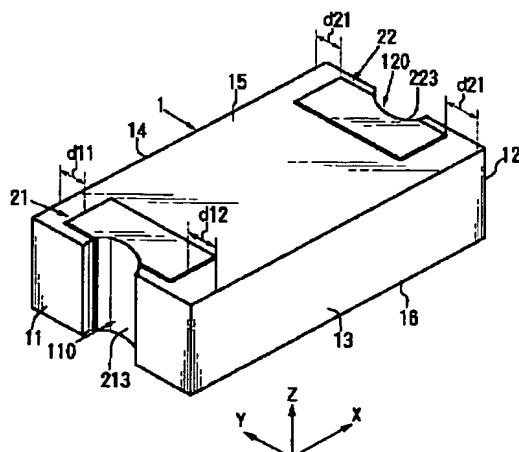
【図13】



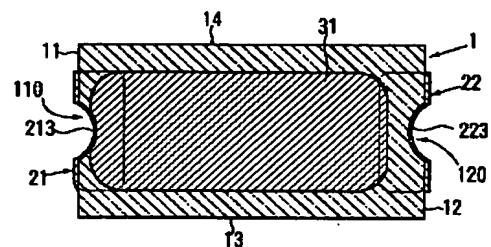
[図17]



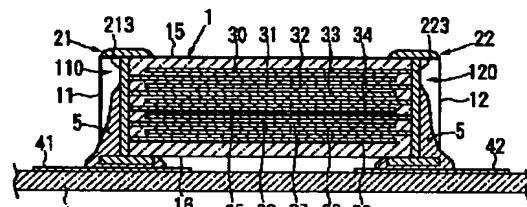
[図19]



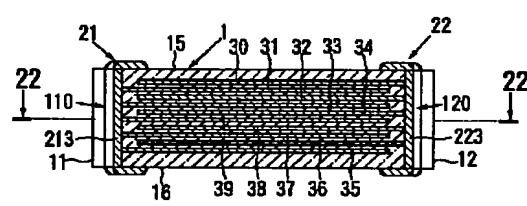
【图16】



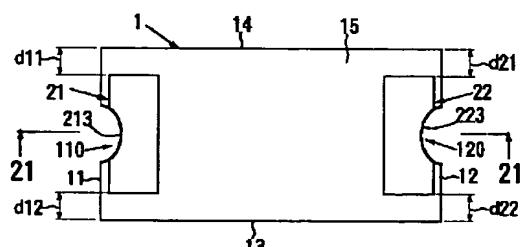
【図18】



【図21】

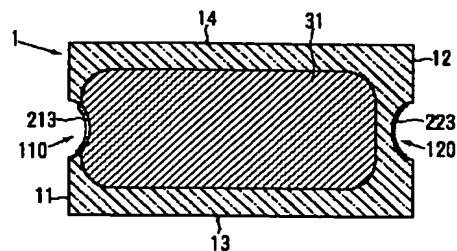


〔図20〕

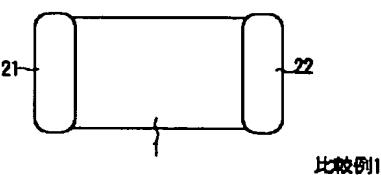


Y A

【図22】

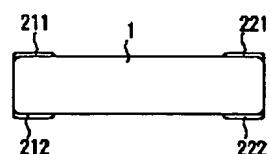


【図23】



比較例1

【図24】



比較例2

PATENT ABSTRACTS OF JAPAN

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(21)Application number : 09-355970 (71)Applicant : TDK CORP

(22)Date of filing : 25.12.1997 (72)Inventor : KAMIYA TAKASHI
ABIKO TAISUKE

(54) CHIP-SHAPED ELECTRONIC COMPONENT

(57)Abstract:

PROBLEM TO BE SOLVED: To provide a chip-shaped electronic component which is capable of sharply improve mounting density.

SOLUTION: For a substrate 1, both sides faces 11 and 12 in a longitudinal direction X and both side faces 13 and 14 in a lateral direction Y cross each other. Outer electrodes 21 and 22 are severally installed only at both ends in the longitudinal direction X of the substrate 1 and are made to be electrically continuous with circuit elements and intervals d11 and d12 and d21 and d22 apart from both side faces 13 and 14 in the lateral direction Y.

LEGAL STATUS

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[Kind of final disposal of application other than the examiner's decision of rejection or application converted registration]

[Date of final disposal for application]

[Patent number]

[Date of registration]

[Number of appeal against examiner's decision of rejection]

[Date of requesting appeal against examiner's decision of rejection]

[Date of extinction of right]

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CLAIMS

[Claim(s)]

[Claim 1] They are the chip-like electronic parts currently formed by being the chip-like electronic parts containing a base and two or more external electrodes,

equipping only the both ends of said die-length direction of said base with each of said external electrode, and flowing [as for said base, having the circuit element by the both-sides side of the die-length direction and a crosswise both-sides side crossing,] through it in said circuit element, and separating spacing from said both-sides side of said cross direction.

[Claim 2] They are the chip-like electronic parts said whose spacing it is the chip-like electronic parts indicated by claim 1, and is 10 micrometers or more.

[Claim 3] For each of said external electrode, the pieces of an electrode of said pair are chip-like electronic parts which it has by separating [in / including the piece of an electrode of a pair / are the chip-like electronic parts indicated by claim 1, and / each side face of said die-length direction of said base] spacing in the thickness direction.

[Claim 4] They are the chip-like electronic parts which have the crevice which meets the pars intermedia of said cross direction [in / it is the chip-like electronic parts indicated by claim 1, and / in said base / the both-sides side of said die-length direction] in the thickness direction.

[Claim 5] They are the chip-like electronic parts currently formed by being the chip-like electronic parts indicated by claim 4, and separating [in / said crevice is equipped with each of said external electrode, and / both sides of the thickness direction] spacing from said both-sides side of said die-length direction.

[Claim 6] They are the chip-like electronic parts through which are the chip-like electronic parts indicated by claim 1, and said base had the internal electrode and said internal electrode has flowed in each of said external electrode.

[Claim 7] Chip-like electronic parts which are the chip-like electronic parts indicated by claim 1, and are ceramic condensers.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to chip-like electronic parts.

[0002]

[Description of the Prior Art] In recent years, the spur has started the microminiaturization of chip-like electronic parts with the miniaturization of electronic equipment. For example, the laminating ceramic chip capacitor is miniaturized by even very small dimension called die length of 0.6mm, width of face of 0.3mm, and the thickness of 0.1-0.3mm.

[0003] However, since the conventional chip-like electronic parts had adhered not only on one side face of the die-length direction, and the 2nd page of the thickness direction but on two crosswise side faces, when the external electrode used as the conductor pattern on the circuit board with a pewter is mounted in the circuit board in the both ends of the die-length direction of a base, they need to prepare and arrange insulation distance between other chip-like electronic parts or a circuit element in crosswise both sides.

[0004] And in a soldering process, with the fluidity and the weight of chip-like electronic parts, the pewter adhering to an external electrode spreads crosswise, and produces the phenomenon (pewter flash) protruded outside from a crosswise both-sides side. Therefore, the insulation distance prepared in the both sides of the cross direction of chip-like electronic parts must be set as a

dimension which does not generate the electric short circuit by such pewter flash (pewter fillet).

[0005] For this reason, the limitation was produced in improvement in packaging density irrespective of the microminiaturization of chip-like electronic parts.

[0006] As a means to solve this problem, JP,7-201634,A is indicating the ceramic chip which prepared the external electrode only in the field soldered to the circuit board. However, since the external electrode is formed covering full [of the cross direction of a ceramic chip] in the case of this advanced technology, with the fluidity of a pewter, and the weight of a ceramic chip, a pewter spreads crosswise and cannot prevent the phenomenon overflowing from a crosswise both-sides side.

[0007] Moreover, JP,9-55333,A is indicating the structure of preparing an external electrode in a crosswise both-sides side and the both-ends side of the thickness direction in the both ends of the die-length direction of a base, as another solution means. Since the external electrode is formed in the crosswise both-sides side in the case of this advanced-technology reference, the same problem as JP,7-201634,A is produced.

[0008]

[Problem(s) to be Solved by the Invention] The technical problem of this invention is offering the chip-like electronic parts which may raise packaging density sharply.

[0009]

[Means for Solving the Problem] In order to solve the technical problem mentioned above, the chip-like electronic parts concerning this invention contain a base and two or more external electrodes. The both-sides side of the die-length direction and a crosswise both-sides side cross, and said base has a circuit element. Only the both ends of said die-length direction of said base are equipped with each of said external electrode, and it flows through it in a circuit element, and it separates spacing from said both-sides side of said cross direction, and is formed.

[0010] As mentioned above, as for a base, the both-sides side of the die-length direction and the crosswise both-sides side cross. Namely, as for a base, the configuration serves as an abbreviation rectangular parallelepiped. With such a configuration, the manufacture approach which takes out each chip-like electronic parts is employable with the means of, cutting the wafer in which many chip-like electronic-parts elements were formed, in the shape of a grid for example. For this reason, chip-like electronic parts excellent in mass-production nature are obtained.

[0011] The base has the circuit element, and since it has flowed through each of an external electrode in the circuit element, it can take out outside the electrical characteristics of the circuit element with which the base was equipped from an external electrode.

[0012] The both ends of the die-length direction of a base are equipped with each of an external electrode, respectively. According to this structure, the chip-like electronic parts which solder and mount the external electrode of the both ends of the die-length direction of a base in the conductor pattern on the circuit board etc. are obtained.

[0013] As for a base, the side face of the die-length direction and the crosswise both-sides side cross, and each of an external electrode separates spacing from a crosswise both-sides side, and is formed. The base side which must have been soldered between an external electrode and the both-sides side of the cross direction of a base as it is such structure is generated. Therefore, when it mounts on the circuit board, even if it narrows spacing between the chip-like electronic parts concerned, and the adjoining chip-like electronic parts or the circuit element, there is no room to produce a pewter fillet etc. between the external electrode of the chip-like electronic parts concerned and a contiguity circuit element. For this reason, the packaging density to the circuit board can be raised sharply.

[0014] Various kinds of chip-like electronic parts, such as a capacitor, an inductor, resistance, a thermistor, or a varistor, are contained in the chip-like electronic parts concerning this invention. You may be the composite part which combined

these chip-like electronic parts. The class of the quality of the material of a base, electrical characteristics, or circuit element etc. is selected according to the chip-like electronic parts made into the purpose.

[0015] For example, in obtaining a ceramic condenser, a base consists of dielectric ceramics. In this case, if the laminating of an internal electrode and the dielectric layer is carried out by turns, a stacked type ceramic condenser will be obtained.

[0016] In obtaining an inductor, a base is constituted from the magnetic substance, such as a ferrite, and it prepares a conductor in a base. A conductor is arranged to the front face of a base, or the interior the shape of a straight line, the shape of a spiral, and in the shape of zigzag.

[0017] The base quality of the material and the circuit element in alignment with each property are adopted also about other chip-like electronic parts, for example, resistance, a thermistor, and a varistor.

[0018] Other purposes, configurations, and advantages of this invention are explained in more detail with reference to an accompanying drawing. A drawing only shows an example.

[0019]

[Embodiment of the Invention] The perspective view showing the chip-like electronic parts which drawing 1 requires for this invention, the top view of the chip-like electronic parts which showed drawing 2 to drawing 1 , the front view of the chip-like electronic parts which showed drawing 3 to drawing 1 , and drawing 4 are the sectional views which met four to 4 line of drawing 2 . The illustrated chip-like electronic parts are stacked type ceramic condensers, and contain a base 1 and the external electrodes 21 and 22.

[0020] As for a base 1, the both-sides sides 11 and 12 of the die-length direction X and the both-sides sides 13 and 14 of the cross direction Y cross. Namely, as for a base 1, the configuration serves as an abbreviation rectangular parallelepiped. With such a configuration, the manufacture approach which takes out each chip-like electronic parts is employable with the means of, cutting the

wafer in which many chip-like electronic-parts elements were formed, in the shape of a grid for example. For this reason, chip-like electronic parts excellent in mass-production nature are obtained.

[0021] A base 1 is selected by the value with a dimension [of the die-length direction X] of L= 2.2mm or less. In the case of a stacked type ceramic condenser, typically, C0603 type ($L \times W \times T = 0.6 \times 0.3 \times 0.2$ (mm)), C1005 type ($L \times W \times T = 1.0 \times 0.5 \times 0.4$ (mm)), C2012 type ($L \times W \times T = 2.0 \times 1.2 \times 1.0$ (mm)), etc. are the typical dimension.

[0022] As for a base 1, it is desirable to have given roundness to the dihedral angle section which each side intersects. Such roundness can be given by performing barrel finishing. In an example, a base 1 becomes with the dielectric ceramic which was suitable as a ceramic condenser.

[0023] A base 1 has a circuit element. The example shown in drawing 1 - drawing 4 shows the stacked type ceramic condenser, and a circuit element is constituted by the dielectric ceramic layer between internal electrodes 30-39 and internal electrodes 30-39. Internal electrodes 30-39 are laid under the interior of a base 1. Thus, since the internal electrodes 30-39 which constitute a circuit element are laid under the interior of a base 1, internal electrodes 30-39 are protected with a base 1, and the chip-like electronic parts which raised moisture resistance, endurance, shock resistance, electric insulation, etc. are obtained.

[0024] Internal electrodes 30-39 lap in the thickness direction Z, and the end of the die-length direction X is drawn by turns by the both-sides sides 11 and 12 of the die-length direction X. Namely, the end of the die-length direction X is drawn by the side face 12, and, as for the internal electrodes 30, 32, 34, 36, and 38 to which the even number reference mark was given, the end is drawn by the side face 11, as for the internal electrodes 31, 33, 35, 37, and 39 to which the odd number reference mark was given. The number of an internal electrode is arbitrary.

[0025] Internal electrodes 30-39 have the almost same flat-surface configuration. For example, if an internal electrode 31 is taken out typically and explained, as

shown in drawing 4 , the dimension d3 of the cross direction Y of the drawer electrode section 310 is smaller than the dimension d4 of the cross direction Y of the external electrode 21. It has the same, the internal electrode 33-39 alternately counted on the basis of the internal electrode 31, i.e., the internal electrodes to which the odd number reference mark was given, configuration as an internal electrode 31. The internal electrodes 30-38 to which the even number reference mark was given have the configuration which carried out right-and-left reversal in drawing 4 .

[0026] Drawing 5 shows another mode of internal electrodes 30-39. As for the internal electrode 31, in drawing 5 , the dimension d3 of the cross direction Y of the drawer electrode section 310 has become almost equal to the dimension d4 of the cross direction Y of the external electrode 21. However, the internal electrode pattern shown in drawing 4 R> 4 and drawing 5 is an example, in addition it cannot be overemphasized that various patterns can be taken.

[0027] Again, it explains with reference to drawing 1 - drawing 4 . Among the external electrodes 21 and 22, the end section of the die-length direction X of a base 1 is equipped with the external electrode 21, and from the both-sides sides 13 and 14 of the cross direction Y, it separates spacing d11 and d12, respectively, and is formed. The other end of the die-length direction X of a base 1 is equipped with the external electrode 22, and from the both-sides sides 13 and 14 of the cross direction Y, it separates spacing d21 and d22, respectively, and is formed.

[0028] The external electrode 21 is formed in the side face 11 of the die-length direction X of a base 1, and is carried out. Since the end of the internal electrodes 31-39 to which the odd number reference mark was given is drawn by the side face 11, the external electrode 21 flows in the internal electrodes 31-39 to which the odd number reference mark was given. The external electrode 22 is formed in the side face 12 of the die-length direction X of a base 1. Since the end of the internal electrodes 30-38 to which the even number reference mark was given is drawn by the side face 12, the external electrode 22 flows in the internal

electrodes 30-38 to which the even number reference mark was given. The external electrodes 21 and 22 can be formed by application of a well-known technique in these seed electronic parts.

[0029] According to the above-mentioned structure, the electrostatic capacity which becomes settled with the number of layers of internal electrodes 30-39 and an opposed face product, and the dielectric constant and number of layers of a dielectric ceramic layer that exist between them can be taken out from the external electrodes 21 and 22 outside.

[0030] The external electrode 21 is continued and formed in the side face 11 of the die-length direction X of a base 1, and both sides 15 and 16 of the thickness direction Z in an example. The external electrode 22 is continued and formed in the side face 12 of the die-length direction X of a base 1, and both sides 15 and 16 of the thickness direction Z. A soldering area big enough by this is securable.

[0031] Drawing showing the mounting condition of chip-like electronic parts which showed drawing 6 in drawing 1 - drawing 5 , and drawing 7 are the sectional views which met seven to 7 line of drawing 6 . The external electrode 21 with which the both ends of the die-length direction X of a base 1 were equipped is used as the conductor pattern 41 on the circuit board 4 soldering 5 in mounting to the circuit board 4, and the external electrode 22 of the other end of the die-length direction X is used as the conductor pattern 42 on the circuit board 4 soldering 5 so that it may illustrate.

[0032] In the chip-like electronic parts built over this invention here a base 1 The side faces 11 and 12 of the die-length direction X and the both-sides sides 13 and 14 of the cross direction Y cross. The external electrode 21 Since spacing d11 and d12 is separated from the both-sides sides 13 and 14 of the cross direction Y and it is formed, the base front face of spacing d11 and d12 is generated between the external electrode 21 and the both-sides sides 13 and 14 of the cross direction Y of a base 1. The base front face of these spacing d11 and d12 must have been soldered.

[0033] Since the external electrode 22 also separates spacing d21 and d22 and

is formed from the both-sides sides 13 and 14 of the cross direction Y, the base front face of spacing d21 and d22 is generated between the external electrodes 21 and 22 and the both-sides sides 13 and 14 of the cross direction Y of a base 1. The base front face of these spacing d21 and d22 must have been soldered.

[0034] Therefore, even if it narrows spacing between Qchip-like electronic-parts Q1-2 when two chip-like electronic parts Q1 and Q2 are mounted on the circuit board 4 so that it may illustrate to drawing 6 , there is no room to produce a pewter fillet etc. among Qchip-like electronic-parts Q1-2. For this reason, the packaging density to the circuit board 4 can be raised sharply. The chip-like electronic parts which adjoin the chip-like electronic parts concerned and are arranged may be the chip-like electronic parts of other type, and may be conductor patterns etc. Also in this case, the same operation effectiveness is done so.

[0035] Drawing 8 shows the condition of having mounted much chip-like electronic parts. Very narrow spacing which contacted substantially each of the chip-like electronic parts Q11-Q33 is separated, and it can arrange crosswise and can go so that it may illustrate.

[0036] As for spacing d11, d12, d21, and d22, it is desirable that it is 10 micrometers or more. It can prevent certainly that a pewter fillet occurs that it is 10 micrometers or more in spacing between the external electrodes 21 and 22 and other circuit elements.

[0037] As for the external electrodes 21 and 22, it is desirable to occupy 30% or more of area from a viewpoint which secures sufficient soldering reinforcement in each of the both-sides sides 11 and 12 which faces in the die-length direction X.

[0038] The perspective view showing another example of the chip-like electronic parts which drawing 9 requires for this invention, the top view of the chip-like electronic parts which showed drawing 10 to drawing 9 , the sectional view where drawing 11 met 11 to 11 line of drawing 10 , and drawing 12 are the sectional views which met 12 to 12 line of drawing 11 . In these drawings, the same reference mark is attached to the same component as the component illustrated

by drawing 1 - drawing 5 . In this example, each of the section electrodes 21 and 22 contains the piece of an electrode of a pair (211 212), and (221, 222). In the side face 11 of the die-length direction X of a base 1, the pieces 211 and 212 of an electrode of a pair separate spacing d15 in the thickness direction Z, and are arranged in it. Similarly, in the side face 12 of the die-length direction X of a base 1, the pieces 221 and 222 of an electrode of a pair separate spacing d25 (refer to drawing 11) in the thickness direction Z, and are arranged in it.

[0039] The conductors (through hole conductor) 210 and 220 prolonged in the thickness direction Z of a base 1 are laid under the both-ends side of the die-length direction X of a base 1. In the interior of a base 1, the conductor 210 flowed in the internal electrodes 31-39 to which the odd number reference mark was given, and has flowed in the pieces 211 and 212 of an electrode in both sides 15 and 16 of the thickness direction Z further, respectively (drawing 1111 , 12 reference). In the interior of a base 1, the conductor 220 flowed in the internal electrodes 30-38 to which the even number reference mark was given, and has flowed in the pieces 221 and 222 of an electrode in both sides 15 and 16 of the thickness direction Z further, respectively.

[0040] In the example illustrated by drawing 9 - drawing 12 , since the piece 211 of an electrode which constitutes the external electrode 21 separates spacing d11 from the side face 14 of the cross direction Y and is formed, the base front face where spacing d11 must have been soldered between the piece 211 of an electrode and the side face 14 of the cross direction Y of a base 1 produces it. Since another piece 212 of an electrode which constitutes the external electrode 21 separates spacing d12 from the side face 14 of the cross direction Y and is formed, the base front face where spacing d12 must have been soldered between the piece 212 of an electrode and the side face 14 of the cross direction Y of a base 1 produces it.

[0041] Furthermore, since the piece 221 of an electrode which constitutes the external electrode 22 separates spacing d21 from the side face 13 of the cross direction Y and is formed, it has spacing d21 between the piece 221 of an

electrode, and the side face 13 of the cross direction Y of a base 1, and the base front face which must have been soldered produces it. Moreover, since the piece 222 of an electrode which constitutes the external electrode 22 separates spacing d22 from the side face 14 of the cross direction Y and is formed, it has spacing d22 between the piece 222 of an electrode, and the side face 14 of the cross direction Y of a base 1, and the base front face which must have been soldered produces it.

[0042] Therefore, when mounted in the circuit board, even if it narrows spacing between chip-like electronic parts, there is no room to produce a pewter fillet etc. For this reason, the packaging density to the circuit board can be raised sharply.

[0043] The perspective view showing another example of the chip-like electronic parts which drawing 13 requires for this invention, the top view of the chip-like electronic parts which showed drawing 14 to drawing 13 , the sectional view where drawing 15 met 15 to 15 line of drawing 14 , and drawing 16 are the sectional views which met 16 to 16 line of drawing 15 . In drawing, the same reference mark is given to the same component as the component illustrated by drawing 1 - drawing 5 . In this example, a base 1 has the crevices 110 and 120 which meet the pars intermedia of the cross direction Y in the both-sides sides 11 and 12 of the die-length direction X in the thickness direction Z. It adheres to the polar zone 213 and 223 which constitutes the external electrodes 21 and 22 in crevices 110 and 120. It has flowed through the polar zone 213 in the internal electrodes 31-39 to which the odd number reference mark was given (drawing 15 , 16 reference). It has flowed through the polar zone 223 in the internal electrodes 30-38 to which the even number reference mark was given.

[0044] Drawing showing the mounting condition of chip-like electronic parts which showed drawing 17 in drawing 13 - drawing 16 , and drawing 18 are the sectional views which met 18 to 13 line of drawing 17 . In mounting to the circuit board 4, the external electrode 21 is used as the conductor pattern 41 on the circuit board 4 soldering 5, and the external electrode 22 is used as the conductor pattern 42 on the circuit board 4 soldering 5 so that it may illustrate. Soldering 5 is

performed mainly on the interior of crevices 110 and 120, and the outskirts of it. [0045] Here, since the external electrode 21 separates spacing d11 and d12 from the both-sides sides 13 and 14 of the cross direction Y and is formed, the base front face of spacing d11 and d12 produces it between the external electrode 21 and the both-sides sides 13 and 14 of the cross direction Y of a base 1. The base front face of these spacing d11 and d12 must have been soldered.

[0046] Since the external electrode 22 also separates spacing d21 and d22 and is formed from the both-sides sides 13 and 14 of the cross direction Y, the base front face of spacing d21 and d22 is generated between the external electrodes 21 and 22 and the both-sides sides 13 and 14 of the cross direction Y of a base 1. The base front face of these spacing d21 and d22 must have been soldered.

[0047] Therefore, even if it narrows spacing between Qchip-like electronic-parts Q1-2 when two chip-like electronic parts Q1 and Q2 are mounted on the circuit board 4 so that it may illustrate to drawing 17 , there is no room to produce a pewter fillet etc. among Qchip-like electronic-parts Q1-2. For this reason, the packaging density to the circuit board 4 can be raised sharply. The chip-like electronic parts which adjoin the chip-like electronic parts concerned and are arranged may be the chip-like electronic parts of other type, and may be conductor patterns etc. Also in this case, the same operation effectiveness is done so.

[0048] The perspective view showing another example of the chip-like electronic parts which drawing 19 requires for this invention, the top view of the chip-like electronic parts which showed drawing 20 to drawing 19 , the sectional view where drawing 21 met 21 to 21 line of drawing 20 , and drawing 22 are the sectional views which met 22 to 22 line of drawing 21 . In drawing, the same reference mark is given to the same component as the component illustrated by drawing 13 - drawing 16 . A different point from the example illustrated by drawing 13 - drawing 16 is that the external electrodes 21 and 22 are formed in the interior of crevices 110 and 120. Also in this example, the same operation effectiveness is done so with having explained with reference to drawing 13 -

drawing 16 .

[0049] Next, the data of the components loading density (piece/cm²) in a concrete example and the example of a comparison are shown.

[0050] The components loading density (piece/cm²) of the chip-like electronic parts of three types was investigated about examples 1-3 and the examples 1 and 2 of a comparison. The chip-like electronic parts which showed the example 1 to drawing 1 - drawing 5 , the chip-like electronic parts which showed the example 2 to drawing 9 - drawing 12 , and an example 3 are examples shown in drawing 13 - drawing 16 . The examples 1 of a comparison are chip-like electronic parts shown in drawing 23 , and it sets to the both ends of the die-length direction of a base 1. The chip-like electronic parts which made the external electrodes 21 and 22 adhere to the 2nd page of one side face of the die-length direction, two crosswise side faces, and the thickness direction, and the example 2 of a comparison are the chip-like electronic parts shown in drawing 2424 , and are set to the both ends of the die-length direction. They are the chip-like electronic parts which prepared an external electrode (211 212), and (221, 222) only in both sides of the thickness direction of a base 1. Examples 1-3 and the examples 1 and 2 of a comparison contain three sorts, C0603 type, C1005 type, and C2012 type. Three sorts of these types of dimension is as follows.

[0051] C0603 type: LxWxT=0.6x0.3x0.2 (mm)

C1005 type: LxWxT=1.0x0.5x0.4 (mm)

C2012 type: LxWxT=2.0x1.2x1.0 (mm)

表1

	部品積載密度(個/cm ²)		
	C0603型 L=0.6mm W=0.3mm T=0.2mm	C1005型 L=1.0mm W=0.5mm T=0.4mm	C2012型 L=2.0mm W=1.2mm T=1.0mm
実施例1(図1~5)	303	133	33
実施例2(図9~12)	370	154	36
実施例3(図13~16)	417	167	38
比較例1	112	67	24
比較例2	185	96	29

As shown in Table 1, the components loading density of all of the examples 1-3 concerning this invention is improving remarkably rather than the examples 1 and 2 of a comparison.

[0052] If it explains more concretely, in the case of examples 1-3, it is the thing of C1005 type and the components loading density more than the components loading density of C0603 type of the examples 1 and 2 of a comparison can be realized. Especially the improvement effectiveness of a components loading density is remarkable by C0603 type, for example, in the case of an example 3, about 4 a little less than times [of the example 1 of a comparison] components loading density is realizable.

[0053]

[Effect of the Invention] As explained above, according to this invention, the chip-like electronic parts which may raise the packaging density to the circuit board sharply can be offered.

[Translation done.]

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] It is the perspective view showing the chip-like electronic parts

concerning this invention.

[Drawing 2] It is the top view of the chip-like electronic parts shown in drawing 1 .

[Drawing 3] It is the sectional view which met three to 3 line of drawing 2 .

[Drawing 4] It is the sectional view which met four to 4 line of drawing 3 .

[Drawing 5] It is drawing showing another internal electrode structure of the chip-like electronic parts concerning this invention.

[Drawing 6] It is drawing showing the mounting condition of the chip-like electronic parts shown in drawing 1 - drawing 5 .

[Drawing 7] It is the sectional view which met seven to 7 line of drawing 6 .

[Drawing 8] It is drawing showing the condition of having mounted much chip-like electronic parts concerning this invention.

[Drawing 9] It is the perspective view showing another example of the chip-like electronic parts concerning this invention.

[Drawing 10] It is the top view of the chip-like electronic parts shown in drawing 9 .

[Drawing 11] It is the sectional view which met 11 to 11 line of drawing 10 .

[Drawing 12] It is the sectional view which met 12 to 12 line of drawing 11 .

[Drawing 13] It is the perspective view showing still more nearly another example of the chip-like electronic parts concerning this invention.

[Drawing 14] It is the top view of the chip-like electronic parts shown in drawing 13 .

[Drawing 15] It is the sectional view which met 15 to 15 line of drawing 14 .

[Drawing 16] It is the sectional view which met 16 to 16 line of drawing 15 .

[Drawing 17] It is the top view showing the mounting condition of the chip-like electronic parts shown in drawing 13 - drawing 16 .

[Drawing 18] It is the sectional view which met 18 to 18 line of drawing 17 .

[Drawing 19] It is the perspective view showing still more nearly another example of the chip-like electronic parts concerning this invention.

[Drawing 20] It is the top view of the chip-like electronic parts shown in drawing 19 .

[Drawing 21] It is the sectional view which met 21 to 21 line of drawing 20 .

[Drawing 22] It is the sectional view which met 22 to 22 line of drawing 21 .

[Drawing 23] It is the top view showing the conventional chip-like electronic parts (example 1 of a comparison).

[Drawing 24] It is the front view showing another conventional chip-like electronic parts (example 2 of a comparison).

[Description of Notations]

1 Base

21 22 External electrode

30-39 Internal electrode

4 Circuit Board

41 42 Conductor pattern

[Translation done.]

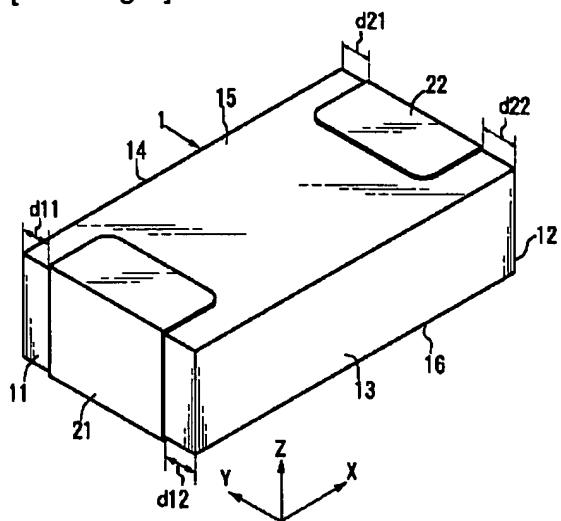
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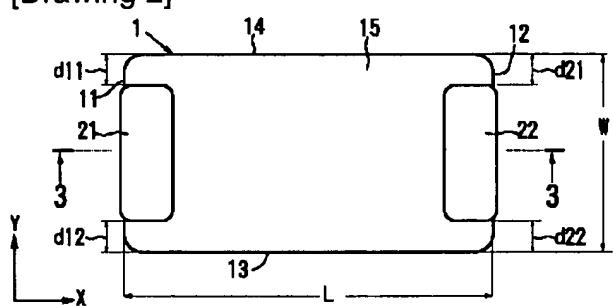
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DRAWINGS

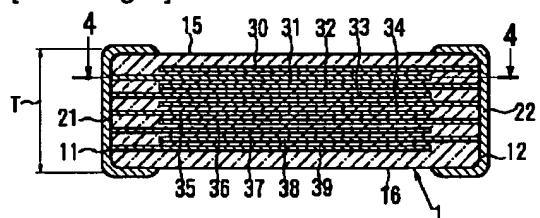
[Drawing 1]



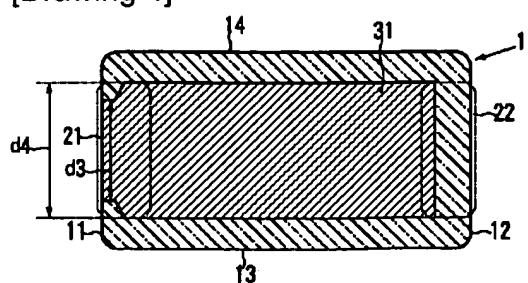
[Drawing 2]



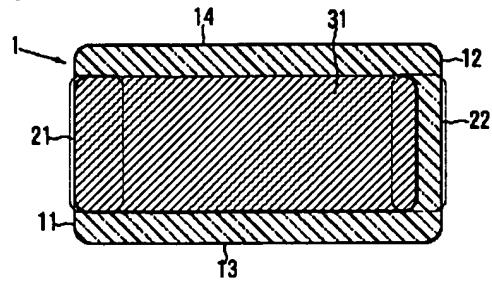
[Drawing 3]



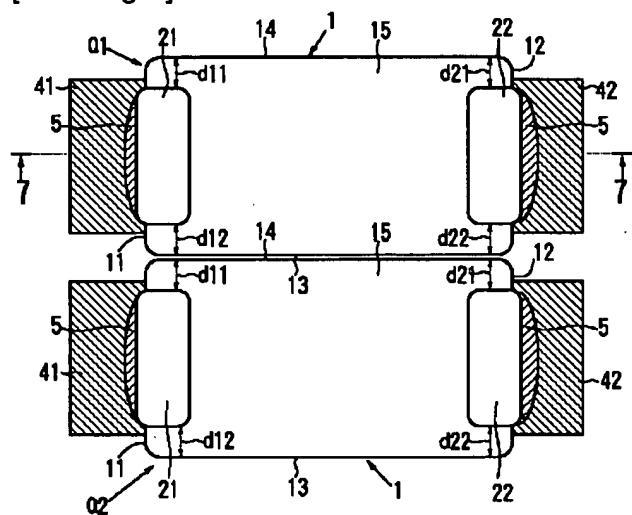
[Drawing 4]



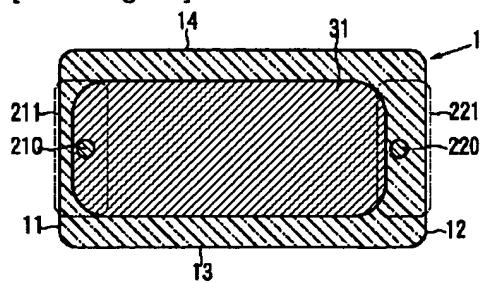
[Drawing 5]



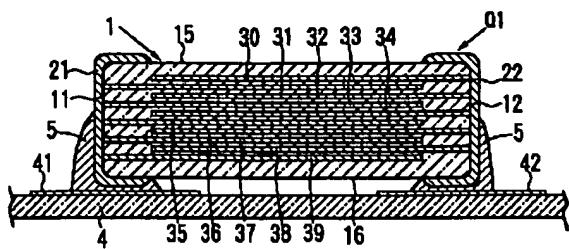
[Drawing 6]



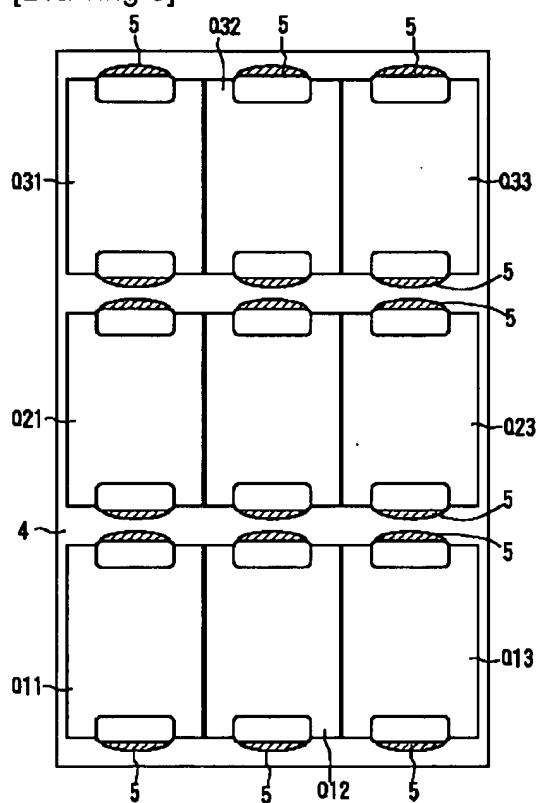
[Drawing 12]



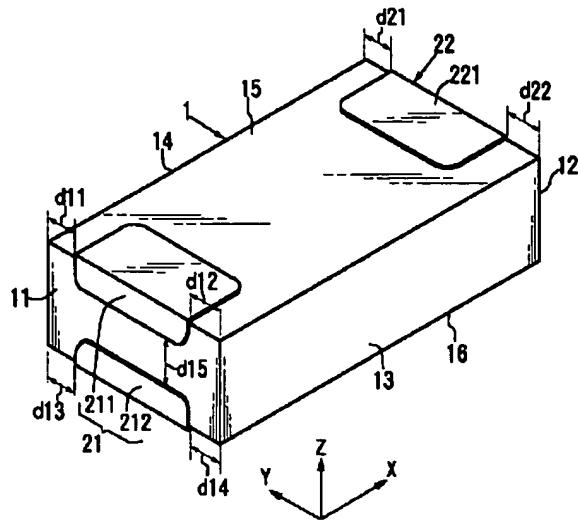
[Drawing 7]



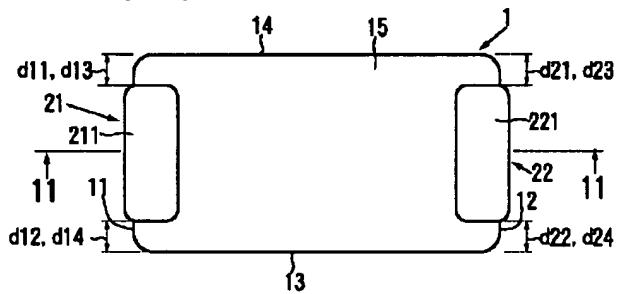
[Drawing 8]



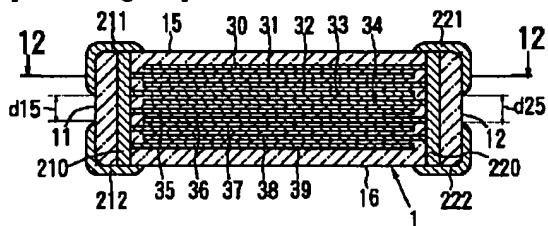
[Drawing 9]



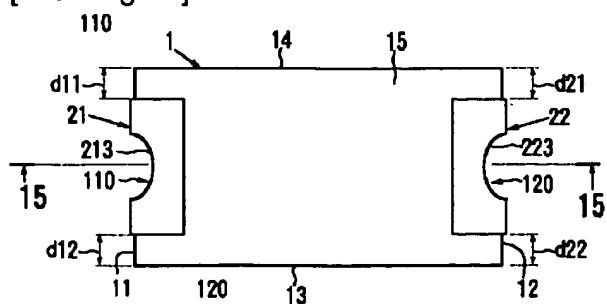
[Drawing 10]



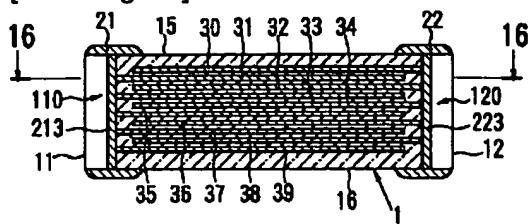
[Drawing 11]



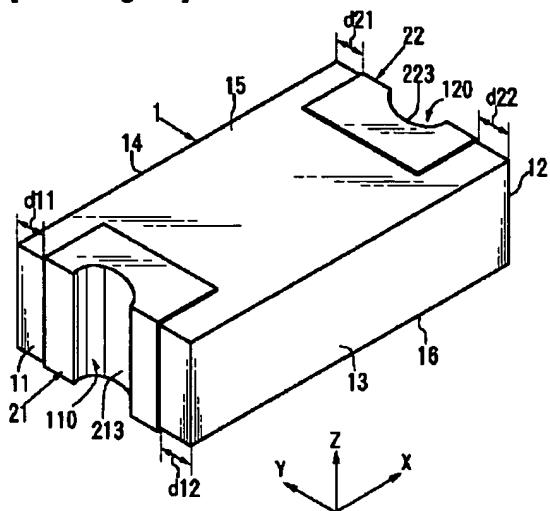
[Drawing 14]



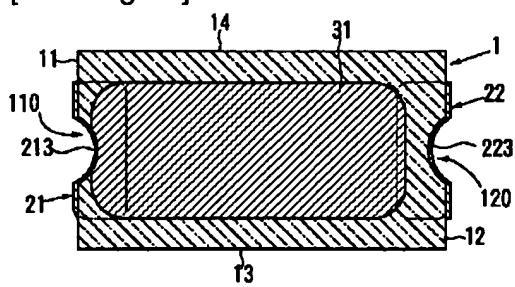
[Drawing 15]



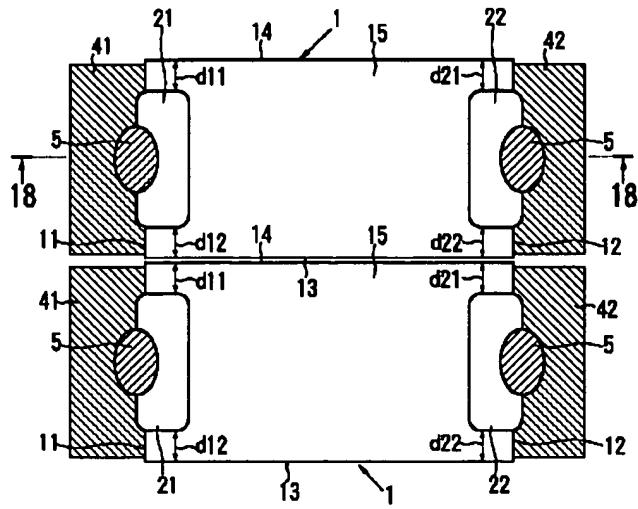
[Drawing 13]



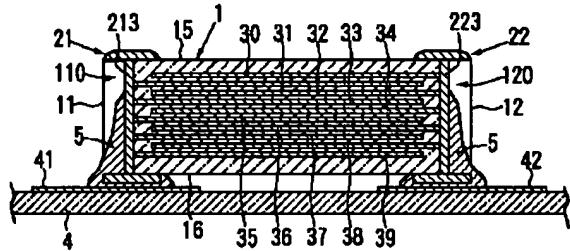
[Drawing 16]



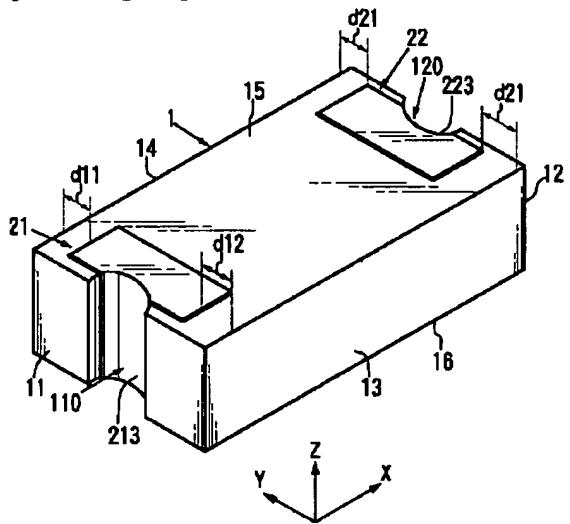
[Drawing 17]



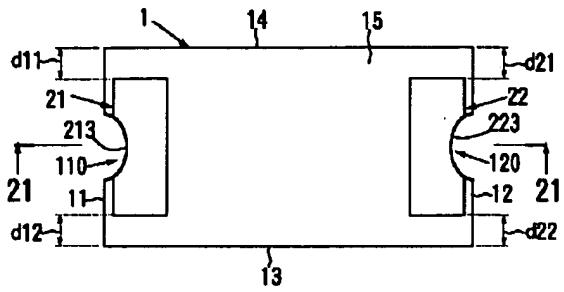
[Drawing 18]



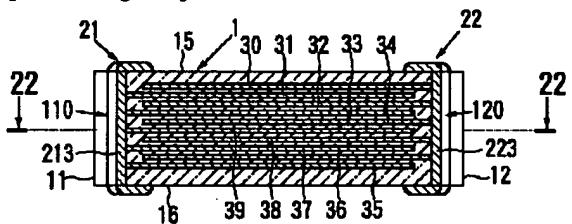
[Drawing 19]



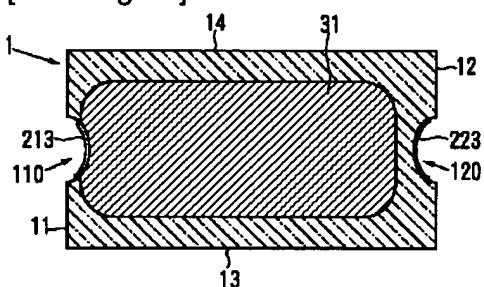
[Drawing 20]



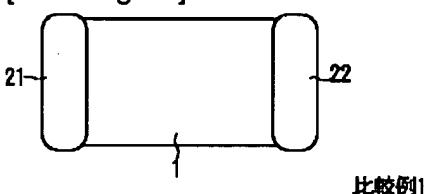
[Drawing 21]



[Drawing 22]

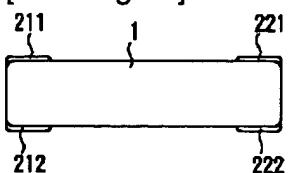


[Drawing 23]



比較例1

[Drawing 24]



比較例2

[Translation done.]